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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
CHAN, ALEX H	

ART UNIT	PAPER NUMBER
2633	7

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/877,684	GE ET AL.	
	Examiner	Art Unit	
	Alex H Chan	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 June 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-77* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *2-32 and 54-60* is/are allowed.

6)☒ Claim(s) *1,33-53 and 61-77* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 June 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: optical switch "10" [e.g. 0037], space switches "19" (e.g. [0042]), optical space switch block "18" of Fig. 2, (e.g. [0042]) and broadcast and select switch "26" of Fig. 3, (e.g. [0055]). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. **Claims 1 and 33-44** are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,734,486 to Guillemot et al (hereinafter Guillemot).

Regarding claims 1 and 41-42, Guillemot discloses a scalable Wave Division Multiplexing (WDM) optical IP switching method (C, Fig. 2), comprising the steps of: receiving one or more optical signals, comprising a plurality of optical data packets (via E_1 to E_n), at an optical switch along one or more input fibers (via fibers which E_1 to E_n are coupled or 14 or 24), wherein each data packet has a payload and header information (Col. 4, lines 31-33) and wherein

each input fiber (e.g. fiber 12_1 of Fig. 2) is capable of transmitting data packets on at least one input wavelength (Col. 2, lines 5-6, lines 10-11); extracting the header information from each data packet (via 12 of Fig. 2 or 12of Fig. 6 and Col. 15, lines 46-55); converting the header information for each data packet to an electrical format (e.g. via PIN 123 of Fig. 6 in each 12_1 to 12_n of Fig. 2, and Col. 15, lines 14-16); processing the header information for each data packet at a control unit to generate control signals (via control unit 40 of Fig. 2 or 40 of Fig. 6) to control data packet payload routing through the optical switch (Col. 11, lines 39-49 and Col. 16, lines 7-34); routing the payload from each data packet through the optical switch (e.g. 10, 20 and 30) in an all-optical manner (Col. 15, lines 17-32) to at least one desired switch output; converting the header information for each data packet back to an optical format (via lasers (i.e. electro-optic converter) 104 of Fig. 6 or 204 of Fig. 7); and recombining the payload and header information for each data packet (via 202 of Fig. 8 or 32 of Fig. 2 and Col. 16, lines 19-34) for transmission out of said at least one desired switch output (S_1 to S_p) along one or more output fibers.

Regarding claim 33, Guillemot discloses wherein the maximum number of said input wavelengths is thirty-two (Col. 14, line 41 and Col. 18, lines 27-30).

Regarding claim 34, Guillemot discloses amplifying each input signal (e.g. via 100 of Fig. 6 and Col. 16, lines 14-18).

Regarding claim 35, Guillemot discloses wherein control unit controls data packet payload routing by directing the operation of one or more space switch blocks (e.g. 22 of Fig. 2 and Col. 6, lines 18-26) and one or more broadcast and select switches (e.g. 32 of Fig. 2) with said control signals (Col. 4, lines 4-13).

Regarding claim 36, Guillemot discloses wherein control unit updates said control signals based on header information from said plurality of data packets (e.g. via memory, Col. 2, lines 64-67 or via 12 of Fig. 2).

Regarding claim 37, Guillemot discloses wherein optical switch is scalable up or down (e.g. N inputs and P outputs, Col. 5, lines 26-45, Col. 17, lines 55-65, Col. 18, lines 13-15 and lines 40-43 or by reducing number of wavelength, Col. 8, lines 42-49) to take advantage of improvements in the wavelength capacity of said input fibers.

Regarding claim 38, Guillemot discloses wherein optical switch is used in a multi-terabit optical network (e.g. high bit rate telecommunication networks or 10 terahertz, Col. 1, lines 14-21).

Regarding claim 39, Guillemot discloses wherein converting the header information from each data packet using a plurality of optical-to-electrical converters (via PIN 123 of Fig. 6 and Col. 15, lines 14-16).

Regarding claim 40, Guillemot discloses wherein said control unit further comprises software instructions to control functionality of said control unit (e.g. central processor, Col. 4, lines 9-10).

Regarding claim 43, Guillemot discloses wherein one or more of said plurality of data packets are received at said optical switch along a common one of said input fibers (14 or 24 of Fig. 2) and transmitted from said optical switch along a plurality of different output fibers (e.g. optical switch having N inputs and P outputs, Col. 17, lines 42-45).

Regarding claim 44, Guillemot discloses wherein optical switch is independent of the rate of transmission of said plurality of data packets (e.g. since the optical switch only depends upon reading the header of each optical packet and for identifying the corresponding routing, it is independent on the rate of transmission, Col. 19, lines 46-47).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claims 45-53 and 61-77** are rejected under 35 U.S.C. 103(a) as being unpatentable over Guillemot in view of U.S. Patent No. 6,404,940 B1 to Tsuyama et al (hereinafter Tsuyama).

Regarding claims 45 and 52-53, Guillemot discloses all limitations as discussed in rejecting claim 1 above, and further discloses one or more input splitters for splitting each of said optical signals into one or more identical signals (e.g. splitters inside 12_1 to 12_n of Fig. 2 or via 210 of Fig. 8); one or more space switch blocks (22 and 23 of Fig. 2) for resolving potential wavelength conflicts among the plurality of data packets based on a desired output status (e.g. by adapting to transpose the wavelength of an optical packet received to a chose on of P/X available wavelengths, Col. 8, line 50-Col. 9, lines 10); one or more input wavelength converters (200 of Fig. 8) for converting the wavelengths of each data packet output from said space switch blocks to one of one or more internal wavelengths (Col. 22, lines 30-45); one or more broadcast and select switches (12 and 13 or 32 of Fig. 2) for resolving any time domain conflicts among the plurality of data packets (e.g. via delay line, Col. 5, lines 54-61 and Col. 17, lines 55-65); one or more output wavelength converters for converting the wavelengths of said plurality of data packets at the output of said BSSs to one of one or more output wavelengths (e.g. via 100 of Fig. 6); one or more control electrical-to-optical converters(104 of Fig. 6 or 204 of Fig. 7) for converting said generated control signals (via "40 FROM" of Fig. 6) into an optical format to

control said data packet routing (e.g. via 104 of Fig. 6 or 204 of Fig. 7); and one or more output multiplexers for multiplexing together into one of one or more output WDM signals the header information and payload of those data packets (e.g. multiplexers inside 100 of Fig. 6 and 200 of Fig. 8) from said plurality of data packets selected for output along said desired switch output.

Though Guillemot does not explicitly disclose a plurality of output electrical-to-optical converters for converting said electric form header information for each data packet back to an optical format, electrical-to-optical converters such as PINs or photodetectors, are notoriously well-known, conventional and widely used technology in the industries that one of the ordinary skilled in the art would have been motivated to employ such means so as to optically convert an electrical header to obtain and the desired optical header information as an output. Therefore, it would have been obvious to one artisan in the same endeavor at the time the invention was made to modify the optical packet switching system of Guillemot so that the electrical header packet can be optically converted for continuous optical processing or outputting.

Still, Guillemot does not explicitly disclose one or more fixed wavelength filters for filtering out ASE noise generated by said input wavelength converters. Tsuyama discloses one or more fixed wavelength filters (84' of Fig. 50) for filtering out ASE noise generated by said input wavelength converters (73 of Fig. 50). Accordingly, one of the ordinary skilled in the art would have been motivated to employ fixed wavelength filters for selecting (i.e. filtering) optical signals of predetermined wavelengths from outputs of switches, for which they constitute as an wavelength selecting section (Col. 14, lines 16-20). Therefore, it would have been obvious to one artisan in the same endeavor at the time the invention was made to modify the optical packet switching system of Guillemot by incorporating fixed wavelength filters so as to provide

selecting function for selecting optical signals of predetermined wavelengths from outputs of switches as taught by Tsuyama.

Regarding claim 46, Guillemot discloses wherein the number of signals output from said input splitters is equal to the number of said one or more input fibers (e.g. the number of signals output from 210 of Fig. 8 is equal to the number of said one or more delay lines in Fig. 2).

Regarding claim 47, Guillemot discloses wherein there is one space switch block per input fiber (for example, there is one space switch block 22_1 per input E_1 or 22_n per input E_n of Fig. 2).

Regarding claim 48, Guillemot in view of Tsuyama discloses wherein each of said space switch blocks (23 of Fig. 2, Guillemot or 33-1 of Fig. 1, Tsuyama) further comprise: one or more space switch splitters (via splitters inside 12 or 22 of Fig. 2, Guillemot or via 32-1 or 12 of Fig. 1, Tsuyama) for further splitting each of the one or more signals received at each switch block into a second set of one or more identical signals; and one or more space switches (22 of Fig. 2, Guillemot or 11 of Fig. 1, Tsuyama) for receiving one signal each from each of said second set of identical signals.

Regarding claim 49, Tsuyama discloses a first set of Semiconductor Optical Amplifiers (SOAs) (19 of Fig. 60) to select one or more signals from each of said second set of identical signals (1-8 of Fig. 60); a coupler (e.g. coupler inside 21 which couples signals from 21 and direct them to 23 of Fig. 61A or via 22 of Fig. 61B) to couple together said selected signals; a demultiplexer (17 of Fig. 60) to separate out the selected signals' data packets by wavelength; a second set of SOAs to select one or more data packets for transmission (16 of Fig. 60); and a multiplexer to forward the selected data packets as one of one or more wavelength resolved output signals (18 of Fig. 60).

Regarding claim 50, Tsuyama discloses wherein selection by said first and second set of SOAs is controlled by said control signals from said control unit (via 9 of Fig. 34-43 for controlling the switch which comprises the SOAs).

Regarding claim 51, Guillemot discloses wherein said control signals are based on said header information (e.g. via 12 and 40 of Fig. 2).

Regarding claim 61, Tsuyama discloses wherein the number of said BSSs (e.g. 5 of Fig. 11, and Fig. 60) is dependent on a relationship with the maximum number of wavelengths carried by an input fiber (e.g. λ_1 to λ_{32}).

Regarding claims 62-63, Guillemot in view of Tsuyama discloses wherein said relationship is one to one or one to two (e.g. via delay lines which can carry several wavelengths at once, Col. 2, lines 10-11, Guillemot or each 51 corresponds to one wavelength, Tsuyama).

Regarding claims 64-65, Guillemot discloses wherein the number of said space switch blocks equals the number of internal wavelengths (e.g. each 23_1 to 23_r corresponds to each wavelength carried by each fiber delay line $14_{1,1}$ to $14_{k,r}$ respectively, Fig. 2).

Regarding claims 66 and 74, Guillemot discloses wherein optical switch is scalable up or down (e.g. N inputs and P outputs, Col. 5, lines 26-45, Col. 17, lines 55-65, Col. 18, lines 13-15 and lines 40-43 or by reducing number of wavelength, Col. 8, lines 42-49) to take advantage of improvements in the wavelength capacity of said FDL (e.g. 14 or 24 of Fig. 2) buffer banks.

Regarding claims 67-68, Guillemot discloses wherein said space switch blocks or BSSs provide for broadcast and multicast capability at the switch level (e.g. 10, 20 and 30 of Fig. 2 provides broadcast and multicast function at different wavelengths depending on the header, Guillemot or Col. 23, lines 19-20, Tsuyama).

Regarding claim 69, Guillemot discloses wherein the maximum number of said input wavelengths is thirty-two (Col. 14, line 41 and Col. 18, lines 27-30).

Regarding claim 70, Guillemot in view of Tsuyama discloses wherein said desired output status is an intended output fiber for each data packet (via S_1 to S_p of Fig. 2, Guillemot or 2-1 to 2-8 of Fig. 11, Tsuyama).

Regarding claim 71, Tsuyama discloses one or more pre-amplifiers (31-1 to 31-8 of Fig. 11) for amplifying each optical signal at the switch input.

Regarding claim 72, Guillemot in view of Tsuyama discloses wherein said control unit controls data packet payload routing by directing the operation of said space switch blocks and said broadcast and select switches with said control signals (e.g. via control signals from 40 of Fig. 2, Guillemot or via control signals from 9 of Fig. 34-42, Tsuyama).

Regarding claim 73, Guillemot discloses wherein control unit updates said control signals based on header information from said plurality of data packets (e.g. via memory, Col. 2, lines 64-67 or via 12 of Fig. 2).

Regarding claim 75, Guillemot discloses wherein optical switch is used in a multi-terabit optical network (e.g. high bit rate telecommunication networks or 10 terahertz, Col. 1, lines 14-21).

Regarding claim 76, Guillemot discloses wherein said control unit further comprises software instructions to control functionality of said control unit (e.g. central processor, Col. 4, lines 9-10).

Regarding claim 77, Guillemot discloses wherein optical switch is independent of the rate of transmission of said plurality of data packets (e.g. since the optical switch only depends upon reading the header of each optical packet and for identifying the corresponding routing, it is independent on the rate of transmission, Col. 19, lines 46-47).

Allowable Subject Matter

6. **Claims 2-32** are allowed.

7. **Claims 54-60** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Sotom et al is cited to show an optical space switch comprising delay lines coupled with a processor for extracting and processing header information (Fig. 3 and 4) Kinoshita is cited to show a broadcast and select switch (Fig. 14). Nishio is cited to show a controller for controller a series of switches, wavelength filters and wavelength converters (Fig. 2). Fatehi et al (US 6,535,313 B1) is cited to show a system control for controlling optical switch and wavelength (Fig. 4). Morthier is cited to show series of optical space switches coupled with splitters, tunable filters and wavelength converter (Fig. 10). Kuroyanagi et al is cited to show space switches coupled with demultiplexers and multiplexers, buffers and filters (Fig. 23-25). Fatehi et al (US 6,512,612 B1) is cited to show another system controller, buffer and timer for controlling optical space switch (Fig. 6A). Beshai et al is cited to show a series of optical space switches and their functionality (Fig. 1). Kim et al is cited to demonstrate a header processor coupled with space switches for routing packets (Fig, 3 and 4). Kang et al is cited to show another control unit for controlling optical switches in an optical switching network (Fig. 4).

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alex H Chan whose telephone number is (703) 305-0340. The examiner can normally be reached on Monday to Friday (8am to 6pm EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (703) 305-4729. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

10. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alex Chan
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March 5th, 2004

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